

**WHAT IS CLAIMED IS:**

1. A wireless communication receiving apparatus, comprising:

an antenna for receiving via first and second wireless communication channels a composite communication symbol that represents first and second communication symbols which correspond to respective results of first and second coding operations performed by a transmitter apparatus on a bit stream and an interleaved version of the bit stream, respectively;

a probability generator coupled to said antenna and responsive to said composite communication symbol for generating, for each of said first and second communication symbols, a corresponding plurality of probabilities that the communication symbol has respective ones of a plurality of possible values of the communication symbol;

first and second SISO decoders respectively corresponding to said first and second coding operations and coupled to said probability generator for respectively receiving therefrom the pluralities of probabilities corresponding to said first and second communication symbols; and

said probability generator operable for generating at least one of said pluralities of probabilities also in response to SISO information received by said probability generator from at least one of said SISO decoders.

2. The apparatus of Claim 1, wherein said probability generator is operable for generating each of said pluralities of probabilities in response to SISO information received by said probability generator from a respective one of said SISO decoders.

3. The apparatus of Claim 2, wherein said probability generator is operable for generating said plurality of probabilities corresponding to said first communication symbol in response to SISO information received from said second SISO decoder, and wherein said probability generator is operable for generating said plurality of probabilities corresponding to said second communication symbol in response to SISO information received from said first SISO decoder.

4. The apparatus of Claim 3, wherein said SISO information from said second SISO decoder includes a further plurality of probabilities that said second communication symbol has respective ones of said plurality of possible values of said second communication symbol, and wherein said SISO information from said first SISO decoder includes a further plurality of probabilities that said first communication symbol has respective ones of said plurality of possible values of said first communication symbol.

5. The apparatus of Claim 4, wherein said plurality of probabilities corresponding to said first communication symbol is received at an a priori output probability terminal of said first SISO decoder, and said plurality of probabilities corresponding to said second communication symbol is received at an a priori output probability terminal of said second SISO decoder.

6. The apparatus of Claim 5, wherein said further pluralities of probabilities are pluralities of a posteriori output probabilities respectively produced by said first and second SISO decoders.

5 7. The apparatus of Claim 4, wherein said further pluralities of probabilities are pluralities of a posteriori output probabilities respectively produced by said first and second SISO decoders.

8. The apparatus of Claim 1, wherein said at least one plurality of  
10 probabilities corresponds to said first communication symbol and said at least one SISO decoder is said second SISO decoder.

9. The apparatus of Claim 8, wherein said SISO information received from said second SISO decoder includes a further plurality of probabilities that said second  
15 communication symbol has respective ones of said plurality of possible values of said second communication symbol.

10. The apparatus of Claim 9, wherein said further plurality of probabilities includes a posteriori probabilities produced by said second SISO decoder.

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11. The apparatus of Claim 1, wherein an a posteriori input probability terminal of at least one of said SISO decoders is coupled via one of an interleaver and a de-interleaver to an a priori input probability terminal of the other of said SISO decoders.

5 12. The apparatus of Claim 11, wherein an a posteriori input probability terminal of the other of said SISO decoders is coupled via one of an interleaver and a de-interleaver to an a priori input probability terminal of said at least one SISO decoder.

10 13. The apparatus of Claim 1, including one of an interleaver and a de-interleaver connected between one of said SISO decoders and said probability generator.

14. The apparatus of Claim 13, including one of an interleaver and a de-interleaver connected between said probability generator and the other of said SISO decoders.

15 15. The apparatus of Claim 14, including an interleaver connected between said one SISO decoder and said probability generator and a de-interleaver connected between said one SISO decoder and said probability generator.

20 16. The apparatus of Claim 15, including an interleaver connected between the other of said SISO decoders and said probability generator and a de-interleaver connected between the other of said SISO decoders and said probability generator.

17. The apparatus of Claim 16, wherein said de-interleaver coupled between said probability generator and said one SISO decoder is connected to an a priori output probability terminal of said one SISO decoder and said de-interleaver coupled between  
5 said probability generator and the other of said SISO decoders is connected to an a priori output probability terminal of the other of said SISO decoders, and wherein said interleaver coupled between said one SISO decoder and said probability generator is connected to an a posteriori output probability terminal of said one SISO decoder and said interleaver coupled between the other of said SISO decoders and said probability  
10 generator is connected to an a posteriori output probability terminal of the other of said SISO decoders.

18. A method of wireless communication, comprising:  
receiving via first and second wireless communication channels a composite  
15 communication symbol that represents first and second communication symbols which correspond to respective results of first and second coding operations performed by a transmitter apparatus on a bit stream and an interleaved version of the bit stream, respectively;

for each of said first and second communication symbols, and responsive to the  
20 composite communication symbol, generating a corresponding plurality of probabilities that the communication symbol has respective ones of a plurality of possible values of the communication symbol;

applying to first and second SISO decoders, which SISO decoders respectively correspond to said first and second coding operations, the pluralities of probabilities that correspond to said first and second communication symbols, respectively; and

said generating step including generating at least one of said pluralities of probabilities also in response to SISO information produced by at least one of the SISO decoders.

19. The method of Claim 18, wherein said generating step includes generating each of said pluralities of probabilities in response to SISO information produced by a respective one of said SISO decoders.

20. The method of Claim 19, wherein said generating step includes generating said plurality of probabilities corresponding to said first communication symbol in response to SISO information produced by said second SISO decoder, and generating said plurality of probabilities corresponding to said second communication symbol in response to SISO information produced by said first SISO decoder.

21. The method of Claim 20, including said second SISO decoder producing its associated SISO information as a further plurality of probabilities that said second communication symbol has respective ones of said plurality of possible values of said second communication symbol, and said first SISO decoder producing its associated SISO information as a further plurality of probabilities that said first communication

symbol has respective ones of said plurality of possible values of said first communication symbol.

22. The method of Claim 21, including providing said plurality of probabilities corresponding to said first communication symbol as a priori output probabilities for use by the first SISO decoder, and providing said plurality of probabilities corresponding to said second communication symbol as a priori output probabilities for use by the second SISO decoder.

23. The method of Claim 21, including the second SISO decoder producing its associated further plurality of probabilities as a plurality of a posteriori output probabilities, and the first SISO decoder producing its associated further plurality of probabilities as a plurality of a posteriori output probabilities.

24. The method of Claim 18, wherein said at least one plurality of probabilities corresponds to said first communication symbol and said at least one SISO decoder is said second SISO decoder.

25. The method of Claim 24, including said second SISO decoder producing its associated SISO information as a further plurality of probabilities that said second communication symbol has respective ones of said plurality of possible values of said second communication symbol.

26. The method of Claim 25, including said second SISO decoder producing said further plurality of probabilities as a posteriori output probabilities.

5 27. The method of Claim 18, including one of said SISO decoders producing a posteriori input probabilities, and performing one of interleaving and de-interleaving on said a posteriori input probabilities produced by said one SISO decoder to provide a priori input probabilities for input to the other of said SISO decoders.

10 28. The method of Claim 27, including the other of said SISO decoders producing a posteriori input probabilities, and performing one of interleaving and de-interleaving on said last-mentioned a posteriori input probabilities to provide a priori input probabilities for input to said one SISO decoder.